Northern Illinois University

Effects of Utility Value and Goals on Task Performance and Interest

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Abstract

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Effects of Utility Value and Goals on Task Performance and Interest

The benefits of academic success are numerous. Education level has been positively related to factors including a significant increase in median yearly earnings (lowest- without a high school degree, highest – obtaining a professional degree) with effects even seen across ethnicity and gender. Other benefits included significantly higher employment rate and lower poverty rates, lower rates of smoking, higher exercise rates, and lower obesity rates (Baum, Ma, & Payea, 2010). Given these benefits it is not surprising that student motivation has been a broad area of study for decades in Social Psychology. Understanding student motivation is paramount to improving both performance in school and general interest. Interest occurs at the interface between a person and a situation; both situational and environmental variable can facilitate interest. Interest has been shown to have strong effects on intrinsic motivation, self esteem, skill, and even performance. Due to the ability of interest to dramatically increase immediate performance as well as long-term engagement of a particular subject, the benefits of learning to enhance interest are limitless.

Feelings of competence, a common component on intrinsic motivation research, are integral to the development of interest. Deci and Ryan (1987) further argue that intrinsically motivated people are likely to engage in activities that interest them (Deci, Vallerand, Pelletier, Ryan, 1991; Durik & Harackiewicz, 2007; Palmer, 2009). Individuals who receive negative feedback about their performance in a given area are less likely to engage with the specific material; however, performing well and perceiving high competence is likely to facilitate re-engagement in the future (Preckel, Götz, & Fretzel, 2010). Eccles et. al. (Cited in Eccles & Wigfield, 2002) described four components of task value: attainment value, intrinsic value, utility value, and cost. Of particular importance to this study are goals, utility, and interest, all of

which are components to influential theories of motivation.

Interest

Hidi and Harackiewicz (2000) claim that interest acts as a conduit between external motivating factors and intrinsic motivation. They further suggest that choice (Kanevsky, 2003; Palmer, 2009; Simkins, Davis-Kean, Eccles, 2006), high self regulation, utility (Hulleman, Durik, Schwiegert, and Harakiewicz, 2008; Hulleman, Godes, Hendricks, Harackiewicz, 2010; Hulleman & Harackiewicz, 2009), and the presence of others (Palmer, 2009) can all facilitate interest. Earlier work on interest distinguished between two types of interest (Schraw & Lehman, 2001), Situational Interest and Personal Interest. Situational Interest has been positively correlated to many positive factors (Csikszentmihalyi & Schiefele, 1994; Hidi & Renninger, 2006; Hunter & Csikszentmihalyi, 2003; Murphy & Alexander, 2002; Schraw & Lehman, 2001). Csikszentmihalyi and Schiefele (1994; p. 263) found that interest correlated with experiences of potency, intrinsic motivation, self esteem, and skill. Interest was also one of the highest predictors of performance (only ahead of it was individual ability). Furthermore, interest was found to be related to utility, feelings of involvement, and feelings of enjoyment. Csikszentmihalyi and Schiefele also found evidence that interest was linked to self-esteem.

Current interest theory suggests, however, that there are two phases of situational interest and two phases of personal interest (Hidi & Renninger, 2006). When participants engage in an activity, there are two possibilities. Either they have previous experience with the activity or they do not. When an individual encounters a novel situation, environmental stimuli are the primary sources of interest generation, or triggered situational interest. Depending on the nature of the activity, more environmental aspects may contribute to holding the individual's attention and interest, known as maintained situational interest. If the individual has had previous experience

with a domain and values it, he or she may possess a level of personal interest. Interest theory suggests that interest is not a stable, long-term construct. Instead, the interests that an individual possesses are dynamic; they can ascend or descend the spectrum. It is this dynamic quality that allows situational interest to continually and repeatedly affect individuals' personal interest. According to Hidi and Renninger, triggered situational interest and maintained situational interest are short-term interest brought on by novel or unexpected stimuli in the environment. Situational interest is typically externally motivated. Early on, it is facilitated by group-work, puzzles, and computers. Advanced levels of situational interest tend to be driven by project-based learning, cooperative group-work, personal tutoring, and utility. Distinctions between triggered situational interest and maintained situational interest have been supported by research (Durik & Harackiewicz, 2007; Linnenbrink-Garcia et. al., 2010; Mitchell, 1993) which is encouraging for elaboration on aspects of Interest theory. It is important to remember that interest can act in a cyclical manner that allows multiple experiences of situational interest to bolster personal interest.

Utility/Perceived Instrumentality

The construct "Utility" has many names including perceived utility, task value, and perceived instrumentality; for the purposes of this paper, the word "Utility" will be used to refer to all of them. Utility refers to how a person values a particular experience for short or long-term pursuits—if the experience is viewed as useful to a person's future or life, the individual is more likely to perceive high utility value. An activity that seems useless is going to have low utility. Work on utility generally supports the idea that students perform better on tasks that they view as useful (Durik, Vida, & Eccles, 2006, Updegraff et al, 1996). DeVolder and Lens (1982) claimed that those who perceived a task as more instrumental were more likely to be persistent and also

reach higher achievement levels. In addition, students who were more persistent in studying found more utility in the task for meeting future goals. They found that students who viewed studying as more instrumental in helping achieve future goals performed better. Miller et. al. (1996; Malka & Corvington, 2005) also found that students who viewed their current performance as instrumental to achieving future goals were more likely to perform better.

Others found that the nature of utility partially determined how strong utility affected performance (Simons, Dewitte, & Lens, 2004; Simons, Dewitte, & Lens, 2003). Again, results indicated that internal motivations tended to make participants more task-oriented, show more interest, excitement, and more persistence in their attempts. Those who were concerned with future goals showed even higher levels of the above-mentioned benefits. These two studies suggest that those who see utility in a current task and believe that it will aid in achieving future goals will perform better and manifest several other potential benefits.

Hulleman, et al. (2008) investigated the role of utility on the development of interest and performance. Study 1 tested utility in the classroom. Their results suggested that utility in the course was linked to increased interest. Additionally, perception of utility in the course also predicted better performance in the course. Study 2 investigated the same relationships, but in a sport camp setting. Results appeared to be similar to those of Study 1; utility perceptions were related to interest and performance. These findings are substantiated by a study by Xiang, McBride, Guan, and Solmon (2003) in a study that found that the task-value students attached to math predicted interest and future intent to engage.

Two recent studies by Hulleman and colleagues (Hulleman et al., 2010; Hulleman & Harackiewicz, 2009) tested the effects of a utility manipulation on student interest and performance. In both cases, during the course of a semester, participants were assigned to an

experimental or control group. The experimental group wrote about the utility of the subject matter whereas the control group simply summarized the lesson. The authors also measured individuals' success expectancy in the domain in order to test whether the effects of the manipulation depended on initial perceptions of competence. The results showed that among students with low success expectancy, those in the utility condition had higher levels of interest and performed than those in the control condition. In contrast, the utility manipulation did not appear to have any effects on students with high expectancy.

To an extent, research suggests that beliefs of utility have potentially facilitating effects on performance. However, success expectancy appears to be a variable that interacts with utility. In the case of the Hulleman, et al.'s research, participants with high success expectancy did not benefit from a utility manipulation. This may have been due to the participants with higher success expectancy feeling under-challenged. It may be possible that increasing the challenge of the situation may allow high- success expectancy individuals to make use of utility. Theoretically, it makes sense that utility should affect all individuals. Therefore, changing the challenge level of the task may make the utility manipulation more effective.

Goal Setting

Latham and Locke (2007) posit that a specific, difficult goal leads to better performance than an abstract, easy goal or none at all (Mitchell & Daniels, 2003). An early (Lock, 1966) inquiry looked at the effect of goals on performance; three experiments were performed to assess these relationships. When participants were given easy and difficult goals, clear disparity in task performance was found; medium goals were comparable to difficult goals and self-set goals roughly in the middle of the spectrum. Generally, Locke found that difficult goals increased performance and this was strongest when the task difficulty was held constant at an easy level

(1966; Mento, Steel, & Karren, 1987; Wood, Mento, & Locke, 1987; Wright, 1990) and that the presence of any goal was more beneficial than no goal at all. Garland (1982) replicated Locke's findings and established that the effect still held when quality of performance was taken into account.

More recent research suggests that although the effect of goals on performance is stronger when tasks are simple, the effect varies depending on the knowledge of the individual (Latham, Mitchell, & Dossett, 1978; Latham, Seijts, & Crim, 2008; Locke & Latham, 2007). Furthermore, setting more difficult goals improves performance as long as the task is within the individual's ability. Even more encouraging was evidence that goal attainment was found to increase positive affect and decrease negative affect.

Specific goals are shown to increase effort (Ames, 1992; Furrer & Skinner, 2003; Jang, Reeve, & Deci, 2010; Kanevsky & Keighley, 2003; Page-Voth & Graham, 1999). Students in goal conditions produce more elaboration, more work, and higher quality work than those in no-goal conditions. Setting specific distal goals also appears to improve academic achievement. Morissano et al. (2010) found that a goal-setting intervention increased GPA relative to a control group, increased probability of keeping a full course load, and showed lower negative affect. Goals set in the study were more general and in multiple domains, but appeared to yield similar effects to classic goal-setting research. It should be noted that the goal literature reviewed here is only a minor portion of the overall body of research. Mitchell, Thompson, and George-Falvy (2000), have reviewed over 1,000 studies of goal-setting that substantiate the claims presented.

Given the effects of goals on performance, their presence in academic settings holds much promise. In addition, difficult goals have been shown to yield larger outcomes than easy goals. If utility is not to motivating high success expectancy participants in the Hulleman et al.

studies, they may benefit from a utility manipulation if they felt challenged by a more difficult goal.

The Current Research

In an attempt to extend the results found in Hulleman et al.'s research, this study included methodology that might identify conditions that facilitate the motivation of individuals with initially high success expectancy. In addition to utility, a goal manipulation was introduced. The current study is an eight-cell, 2 (success expectancy: high, low) x 2 (level of utility: No Utility, Utility) x 2 (goal level: no goal, difficult goal), between-subjects design. Participants' final performance and interest were assessed as the primary dependent variables.

Performance Hypothesis

A 3-way interaction between utility, success expectancy, and goal level was hypothesized. Consistent with Hulleman et al., individuals with low success expectancy would perform better in the utility conditions than those in the control conditions. However, participants with high-success expectancy would benefit from a utility manipulation only in the difficult goal conditions. This effect would not be present among those with high success expectancy when there was no goal. If utility improved performance in challenging situations, then a difficult-goal situation would place success expectancy participants in a similar state of mind to low success expectancy participants.. The literature suggests that participants in the difficult-goal condition will perform better than participants in the no-goal condition, a main effect of goal.

Interest Hypotheses

A 3-way interaction of goal-difficulty, success expectancy and utility was also predicted. Previous research has shown that, among participants with high success expectancy, those in no-utility conditions reported lower interest than those in utility conditions. However, previous

research did not provide participants with goals, which may have reduced feelings of challenge in the situation. In this study, goals were be manipulated, and when goals are present, participants in a more challenging situation (a difficult-goal condition), would show increased interest in the presence of a utility. This contrasts previous research that suggests that high success expectancy individuals will not benefit from a manipulation of utility. Among participants with low success expectancy, interest would not be as high in the difficult-goal condition as the no-goal condition because some participants will not attain their goals.

Boredom

In addition to performance and interest, this study is also aimed to explore boredom. The inclusion of boredom was primarily an attempt to explain why utility only affected certain participants. Much of the interest and utility research, as well as intrinsic motivation theory, invokes the word boredom when describing situations. Boredom has been shown to be a particularly reliable predictor of poor performance (Pekrun, Goetz, Daniels, Stupnisky, Perry, 2010). Researchers have also tended to refer to boredom as the antithesis of interest (Daniels, Stupnisky, Pekrun, Haynes, Perry, Newall, 2009; Fredrisck, Blumenfeld, Paris, 2004; Frenzel, Goetz, Lüdtke, Pekrun, & Sutton, 2009; Martin, 2007; Pekrun, Elliot, Maier, 2009; Pekrun, Elliot, Maier, 2006; Skinner, Furrer, Marchand, & Kindermann, 2008; Skinner, Kindermann, Furrer, 2009). When boredom is included in research, it is often reverse-coded item for interest. Boredom has been linked to a variety of negative outcomes including poor performance, reduced enjoyment, and diminished task value (Acee et al., 2010; Pekrun et al., 2010). In addition, most of the research on boredom treats it as part of the construct of interest rather than something unique.

Pekrun et al. (2010) attribute boredom to a lack of valuation of a task or lack of perceived

control. They found that boredom manifested in several ways. Boredom was confirmed to be negatively affective in nature; it was described as dissatisfaction, emptiness, and lack of goals. Cognitively, students reported an altered perception of time. Physiological and expressive characteristics included sleepiness, yawning, slackened posture, empty gaze, and cold hands. Boredom was also found to be a motivating state—students reported wanting to leave class, wanting to do something else, a lack of intrinsic motivation, a lack of any motivation, desiring to disengage from relevant activities, a reduced quality of performance, and escaping the cause of boredom. The intensity of boredom in academic settings appeared to be relatively low, but the frequency was high. Follow-up work also found that boredom was negatively correlated with feelings of control, task value, and positively with attention problems. Other work on academic affect found that emotions were not stable across domains and that anger was more related to boredom than anxiety (Goetz et al., 2007).

A recent set of studies by Acee et al. (2010) looked to redefine boredom. Study 1 hypothesized that student perceptions of boredom would differ depending on the situational specifics. It was found that there was one factor (Boredom) in under-challenging situations and two factors (Boredom: task-focused and self-focused) in over-challenging situations. The one-factor boredom suggest that boredom is a less complex experience in under-challenging situations. Over-challenging situations yielded more discrimination amongst boredom feelings. Task focused boredom was characterized by feelings of repetition, uselessness, wondering why they were doing it, having nothing to do. Self-focused boredom on the other-hand was characterized by emotions such as frustration, impatience, apathy, wanting something else to do, and being tired of the activity. The items used to assess boredom in the Academic Boredom Scale (ABS-10, ABS-36) were appear to describe the characteristics of boredom described in Pekrun et

al. (2010). Study 2 replicated Study 1 and introduced several more interesting outcomes. Boredom was found to be positively correlated to negative affect and negatively correlated to positive affect (Acee et al., 2010). Self-focused boredom and task focused boredom were correlated, and low correlations between enjoyment and general and self-focused boredom were observed; correlations were nonexistent between enjoyment and task-focused boredom. It is worth noting that the boredom recorded in this study was retrospective, the authors called for future research to include present-time boredom inquiry. This division of boredom into task-focused boredom and self-focused boredom is further substantiated by Preckel, Götz, and Fretzel (2010). Although older research seemed to suggest that boredom existed only in low-challenging situations (Gjesme 1977), Preckel, Götz, and Fretzel found that the frequency of reported boredom was equal in normal and gifted classes, but the type of boredom was different between the two groups.

The assessment of boredom in the current study was largely exploratory. As mentioned, the interest and utility literature often refers to boredom in as the opposite of utility. Several established interest questionnaires include similar constructs that are also used in boredom scales, or even the construct of boredom itself was used to assess interest (Durik & Harackiewicz, 2007; Horvath, Herleman, & McKie, 2006; Hunter & Csikszentmihalyi, 2003; Linnenbrink-Garcia et. al., 2010; Palmer, 2009; Simkins et al., 2006; Zhu et al., 2009).

Researchers have recently claimed that boredom is not on the continuum of interest (Pekrun et al., 2010). The justification is that boredom has been shown as a motivational force whereas lack of interest may not be. A major issue with the debate on the relationship between interest and boredom is the fact that many interest-focused studies have treated interest and boredom as a single, bipolar construct. Given these possible complications to interest research as

well as the observed effects of boredom, it seemed prudent to include an exploratory measure of boredom. As an additional benefit, it is possible that the demotivating effects of boredom may be a variable that is unaccounted for in Hulleman et al.'s research. Based on the claims of boredom researchers, participants with high success expectancies in a no-goal situation may feel unchallenged; this would, in turn, lead to the participant feeling that the task is useless or boring. In addition, the effects of boredom in over-challenging situations may support the prediction that low-competence individuals in the difficult goal situation will display lower interest.

Method

Participants

The current study included 165 participants from an introductory psychology course at a large Mid-western university. The sample included 49.1% women and 50.9% men and had 52.1% white, 26.7% African American, 6.1% Asian American, 9.7% Hispanic American, and 5.5% other. Due to computer problems, 5 participants were omitted from analyses. Additionally, 20 participants were omitted from the performance analysis because they reported using an electronic device to calculate answers. Participants were compensated with extra-credit or course credit.

Materials

Situational Interest. A situational interest questionnaire was included (Linnenbrink-Garcia et al., 2010). The scale is comprised of 8 items (sample item: "I like what I am learning in this session"). The items will be rated on a 7-point scale from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*) such that higher scores are indicative of more situational interest. In addition to a questionnaire, a behavioral measure of interest was also included at the end of the study. Students were given the option to either quit the program or continue to another math technique

and solve more problems.

Success Expectancy. Two items from Hulleman & Harackiewicz (2009) were used to measure success expectancy. The scale consists of 2 items (sample item: "I expect to do well using this new multiplication technique."). Items will be rated on a 7-point scale (1 – *Strongly Disagree*, 7 – *Strongly Agree*). Higher scores indicate higher success expectancy. Success expectancy level was be determined by a mean split and compared to the mean from the original study.

Two-Digit Multiplication Technique. The math technique that participants learn has been used in previous research (Holland, Kosovich, & Durik, 2010). The technique involves four steps that can help an individual to do two-digit multiplication in his or her head (e.g. 25 x 71). Step 1: the two ten's place numbers are multiplied together (20 x 70 = 1400) and the result is committed memory. Step 2: cross multiply the ten's place in the first number with the one's place of the second number (20 x 1 = 20) and the result is added to the first number obtained (1400 + 20 = 1420). Step 3: cross multiply the ten's place in the second number with the one's place in the first number (70 x 5 = 350) and add the result is added to the total (1420 + 350 = 1770). Step 4: multiply both of the numbers in the ones' places together (5 x 1 = 5) and the result is added to the total (1770 + 5 = 1775).

Utility Manipulation. All participants wrote one of two essays. The utility essay had participants write about the utility of the new math technique in their every-day life. The control essay had participants describe the new math technique but not focus them on utility. In an effort to prevent participants from accidentally engaging in the utility manipulation, it seemed feasible that a description of the technique would remain cognitively close to the technique.

Goal Difficulty. Based on previous uses of this program, difficult goals were calculated

by doubling the participants practice score and adding five (practice score X2 +5). In the previous study (Holland, Kosovich, & Durik, 2010), only 25% of participants reached this goal as opposed to the 75% who met the goal of double+2.

Performance. Participants' performance was measured by the number of problems correctly answered during the math-problem sets. Improvement was also be calculated by subtracting the practice score from the problem-set score.

Boredom. Participants were given a boredom questionnaire after completing the problem sets. This study used the Academic Boredom Scale (ABS-10; Acee et al., 2010). This scale is comprised of 10 items, 5 measuring task-focused boredom (sample item: "in this situation, to what extent did you feel it was repetitive?"), and 5 measuring self-focused boredom (sample item: "in this situation, to what extent did you become impatient?"). The participants indicated the strength of the statements by rating them on a nine-point scale (1- *Not at all* , 9- *Extremely*). Higher scores indicated higher levels of boredom. This measure of boredom was chosen because of its ability to discriminate between the different types of boredom. In addition to this benefit, Acee et al. also found that it correlated strongly with another, established, measure of boredom (Pekrun, Goetz, Titz, Perry, 2002).

Self-Report survey. All participants completed a demographic questionnaire asking them to identify their sex and ethnicity.

Procedure and Design

Participants first received a consent form and then completed the study on a laboratory computer. The program then began with participants completing a set of five problems in which they solved simple 2-digit multiplication problems using their traditional method. They were then taught the new math technique in a presentation, followed by a set of twenty-five practice

problems (3-minute time limit). Following the practice session, participants filled out a success expectancy questionnaire and then completed the essay portion. Upon completion, participants were assigned to either a no goal or a hard goal condition. The goals were calculated individually for each participant using the score on the practice set. Participants then completed two sets of math problems (with a three minute time limit) followed by a boredom questionnaire, the situational interest questionnaire, and the demographic questions.

This experiment was a 2 (level of competence: high, low) x 2 (level of utility: No Utility, Utility) x 2 (goal level: no goal, difficult goal) between-subjects experimental design. Utility and Goals are manipulated factors to which participants will be randomly assigned. Success expectancy is a subject variable that will be tested as a third factor. The primary dependent variables are Performance and Interest. Boredom will also be measured.

Results

To examine effects of the manipulations on performance (see Figure 1), a 2 (goal vs. no goal) x 2 (utility vs. no utility) x 2 (low success expectancy vs. high success expectancy) between participant Analysis of Variance (ANOVA) was performed. Practice scores were included as a covariate to account for any pre-existing differences. Due to non-compliance, 20 participants were omitted from the analysis (N = 140). Early in the study, it was discovered that several participants were using calculators and cell phones to help solve problems. A 3-way interaction between utility, success expectancy, and goal level was predicted but the hypothesis was not supported, $F(1,131) = 1.70$, $p = .19$. However, a main effect of success expectancy was present, $F(1, 131) = 5.11$, $p = .03$, indicating that participants with high success expectancy ($M = 20.50$) performed better than participants with low success expectancy ($M = 15.26$). In addition, a marginal effect of goals was observed, $F(1,131) = 3.192$, $p = .08$, participants given a goal (M

= 18.75, SD = 8.7) performed slightly better than participants without a goal (M =16.55, SD = 8.5). No other effects were significant.

The second hypothesis predicted a 3-way interaction on interest (see Figure 2). A 2 (goal vs. no goal) x 2 (utility vs. no utility) x 2 (low success expectancy vs. high success expectancy) between participant ANOVA was performed to test these effects (N = 160). Practice scores were included as a covariate to account for any pre-existing differences. The hypothesis was not supported, but a main effect of utility was observed, F (1, 151) = 4.23, p = .04. Participants in the utility conditions (M = 4.85, SD = 1.5) rated higher interest than participants in the no utility condition (M = 4.34, SD = 1.5) regardless of other factors present.

A third 2 (goal vs. no goal) x 2 (utility x no utility) x 2 (low success expectancy vs. high success expectancy) between participant ANOVA was performed to explore the effects of the manipulations on boredom (N=160; see Figure 3). Practice scores were included as a covariate to account for any pre-existing differences. A main effect of success expectancy was observed, F (1, 151) = 24.25, $p < .01$, indicating that participants with high success expectancies (M = 3.52, SD = 1.6) reported lower boredom than participants with low success expectancies (M = 4.85, SD = 1.8) who reported higher boredom.

Several Pearson's Correlations were computed to further examine the relationship between boredom and interest (Table 1). Responses to the composite Academic Boredom Scale were correlated with reported interest. A moderate, negative correlation was observed between academic boredom and interest (N = 160, r = -.30, $p < .001$). Higher ratings of boredom were related to lower reported interest. Correlations between interest and the ABS subscales, task-focused boredom (N = 160, r = -.26, p = .001) and self-focused boredom (N = 160, r = -.30, $p <$ .001) yielded similar correlations.

Discussion

This study was a replication and extension of previous research which showed that a utility manipulation could improve both performance and interest. Although utility previously did, in fact, appear to positively influence performance and interest among participants with low success expectancies, results for participants with high success expectancies were less encouraging. The current study was an attempt to find positive effects of utility on interest and performance, particularly among participants with high success expectancies. Two hypotheses were put forth predicting three-way interactions between goals, utility, and success expectancy on both interest and performance.

The first hypothesis suggested that utility, goals, and success expectancy would work to enhance performance, however, only success expectancy showed an effect. Participants with higher success expectancies performed better than those with lower success expectancies. It is possible that pre-conceived notions about math ability had a hindering effect on the performance of participants with low success expectancies. In particular, Participants said that math was not a favored subject. Because participants enter college with fairly expansive math exposure, it is likely that their initial attitudes are more set.

Interestingly, the data did show a pattern of results similar to the projected results for high success expectancy participants; i.e. for high success expectancy individuals in utility conditions, there was a difference of almost 7 points between those with no goal and those with a goal. While this occurrence may be entirely due to chance, the emergence of a pattern similar to the hypothesized results does seem to merit further exploration of the performance hypothesis. While the results for high success expectancy showed a pattern similar to what was expected, the results for low expectancy participants were not replicated at all. It may have been that the goal

introduced was too difficult and that participants in the low-expectancy group just felt overwhelmed. It is unlikely that the goal manipulation would work for the low-expectancy participants if they found the task to be too difficult.

The second hypothesis, that there would be a three-way interaction between goals, utility, and success expectancy on interest was also unsupported. Only a main effect of utility was observed in which participants reported higher interest in utility conditions than in no-utility conditions. Consistent with prior research, utility was shown to improve interest in participants with low success expectancies. Interestingly, this effect was also found for participant with high success expectancies, which is contrary to the previous findings.

There are a few different interpretations of the findings for interest. One is that utility actually does affect interest at both levels of success expectancy. There is another more-plausible explanation. It is possible that our introduction of a task goal may have caused an initial drop in interest which then allowed the utility manipulation to have an effect. The pattern of the data showed suggested that a goal without utility was detrimental to the interest of participants who reported high success expectancy. Given that interest theory names task value as necessity for the development of interest (Hidi & Renninger, 2006); it may be the case that people with high success expectancies just do not benefit from utility manipulations. One possible explanation for this is that part of their perception of competence comes from the value that they attach to any given technique. Participants who value the technique highly may feel more optimistic about their future encounters with it; they may use mistakes as a means of improving ability. When given a novel task to engage in, participants who value the task may be more willing to put forth effort. If this is the case, forced manipulations for the purpose of performance enhancement may actually be detrimental to individuals with high success expectancy. Due to the increased

emphasis on performance, participants who value the technique may feel pressured to do well rather than to just learn. Interest theory suggests that the facilitation of interest requires continual upkeep and repeated exposure to the concept in question (Hidi & Renninger, 2006). Attempts to enhance performance in situations with these participants may cause decreased interest which could decrease the likelihood of future engagement.

The results discussed thus far provide future research opportunities in multiple directions. First, repeating the study with a different sample might be beneficial. Patterns in the data, though non-conclusive, beg the question of what affects performance in individuals with higher success expectancy. Given previous research, this study was primarily focused on improving the performance of high-expectancy participants. It might be beneficial to perform future experiments in a population that has higher average ability when attempting to affect performance. Previous studies have successfully improved performance and interest in low-expectancy groups, but it is entirely possible that individuals with low expectancy and individuals with high expectancy require entirely different approaches to facilitate success. The observed data suggests that expectancy for success may actually predict success, which could be interpreted either as participants having an accurate perception of their abilities, or an effect of self-fulfilling prophesies.

In terms of interest, there are also directions to be pursued. While forced goals (goals dictated to the participants) may have detrimental effects on interest, self-set goals may be more useful. Although possible, a previous attempt at testing self-set goals met some resistance because participants either set very easy goals or impossible goals. Volumes of research exist on the effects of different goal types on performance; however, it would benefit researchers to assess the effects of goals on interest.

When asked if a calculator or cell-phone was used to aid in their performance, 20 participants answered "yes." It was decided that these participants were not an accurate representation of performance on the new technique because they were using a calculator rather than any type of mental technique. Although they were omitted from the performance ANOVA, the participants were included in the interest ANOVA; it's possible that the omitted participants were more inclined to cheat because they were uninterested.

Some frequency analyses suggested that the participants who used calculators and cell-phones also displayed lower success expectancy as well as lower interest in the task. It is possible that a desire to demonstrate competence motivated participants to cheat when they felt overwhelmed by a task. While these participants were omitted from analyses for the current study, the fact that the small sub-group exists does merit further exploration in the future. The cheating activity in this study could be similar to actual academic settings in which students who do not value a particular learning experience may be more prone to cheat to avoid demonstrating incompetence.

In addition to the primary hypotheses affecting performance and interest, exploratory measures of boredom were also included. It should be noted that boredom was not included on the whim of the researchers. Instead, it was hypothesized that the existence of boredom in under-challenging situations was to blame for the failure of utility to affect performance. Contrary to the hypothesis, though, an effect of success expectancy was found on boredom in which participants with high expectancies of success actually reported lower boredom than their low expectancy counterparts. It may be that the lower reports of boredom help to explain why there was no interaction between goals, utility, and success expectancy. If high expectancy participants were not bored, but rather were engaged in the task without any manipulations, introduction of

said manipulations may have actually resulted in a negative reaction by the participants. The participants, who otherwise may have felt free to explore the new technique, may have instead felt forced to perform well. Because participants are given a goal, they may feel that they are being assessed in a situation rather than learning a new concept. Perhaps future incarnations of this study would benefit from having participants engage in an already-known. It may just be that people are less interested in a new experience if they feel that they are immediately being assessed on their abilities (which could explain in part why cramming for a test actually yields worse performance).

Finally, the inclusion of a boredom measure also allowed for an additional exploration of boredom and interest. Although many previous studies of interest have counted interest and boredom as two ends of the same continuum, the observed results do not seem to support that belief. The relatively weak negative correlations found between boredom and interest suggests that the two constructs overlap but may not necessarily be the same thing. Further testing is needed, without a doubt, before any real conclusions can be made about the relationship. That being said it may be that one aspect of boredom is particularly in tune with interest. Long-term interest should exist with or without boredom; on the other hand, situational interest may be affected by boredom.

This study faced several limitations. First, the 2 x 2 x 2 design meant that even in a sample of 160 participants, the statistical power was not particularly robust. Second, although the study was concerned with improving performance and interest in high-expectancy participants, low-expectancy participants were also included. Non-compliance threats also forced a minor change in the procedure. After it was discovered that a significant portion (~10%) of participants were cheating, the door to the individual testing rooms were left open. Additionally, the lack of a

boredom measure before the test sets restricted the researchers from assessing the possible effects of boredom on performance.

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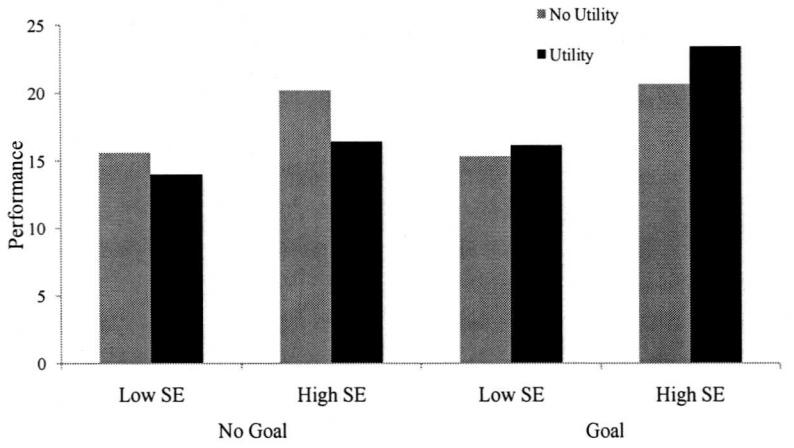

Figure 1. Performance is determined by the total number of problems correctly answered in the two 3-minute problem-solving sessions. SE = Success Expectancy.

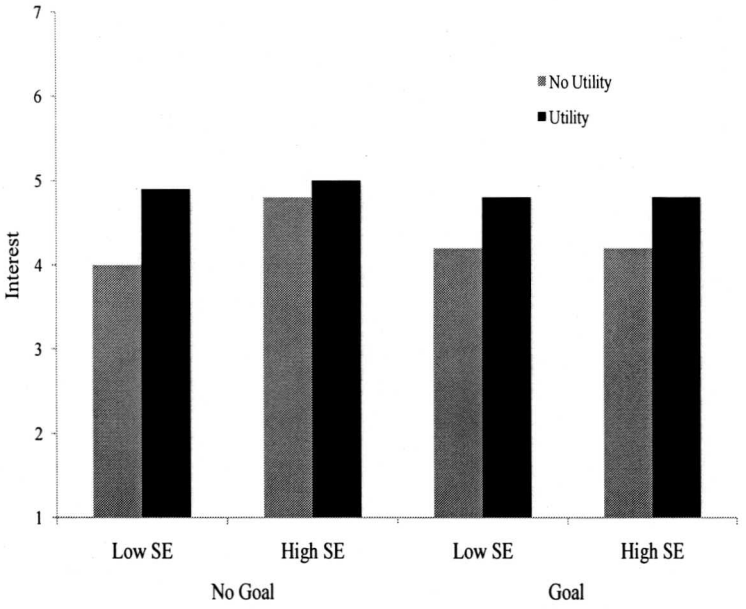

Figure 2. Interest was reported on a 7-point scale after participants completed the problem-solving sessions. SE = Success Expectancy.

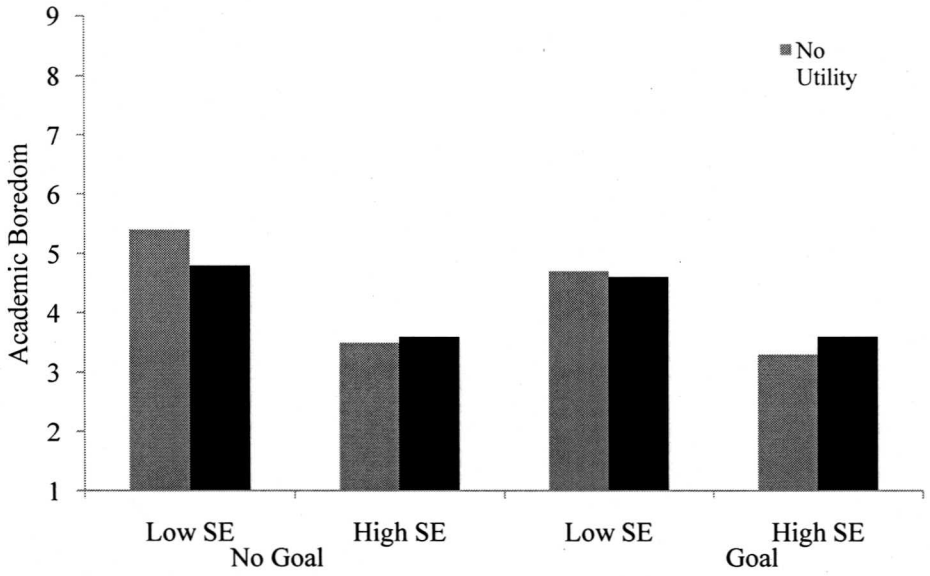

Figure 3. Boredom is determined by a 9-point scale self-report data collected after participants complete the problem-solving sessions. SE = Success Expectancy.

Table 1

Correlation Matrix

	1	2	3	4	5	6
1. Interest	-	-	-	-	-	-
2. Performance	.18**	-	-	-	-	-
3. Practice	.30*	.72**	-	-	-	-
4. S. Expectancy	.30**	.29**	.15	-	-	-
5. ABS-10	-.30**	-.32**	-.14	-.54**	-	-
6. Self-Focused	-.30**	-.35**	-.16*	-.53**	.96**	-
7. Task Focused	-.26**	-.23*	-.09	-.48**	.92**	.78**

* $p < .05$, two-tailed. ** $p < .001$, two-tailed.